

A New Species of *Dendrodoris* (Mollusca: Nudibranchia: Dendrodorididae) from the Pacific Coast of North America

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A new species of the genus *Dendrodoris*, *D. azineae*, is described based on a specimen collected from La Jolla Canyon, San Diego County, and photographs of animals from Sycamore Banks, Malibu and Carmel Bay, California. *Dendrodoris azineae* is characterized externally by its unique color, dissimilar to any described species worldwide, having purple gills and rhinophores. Internally, *D. azineae* differs from other eastern Pacific species in the size of the prostate and bursa copulatrix, and shape and size of the ampulla and the genital atrium. Thus far *D. azineae* is only known from southern to central California.

The status of species assigned to the family Dendrodorididae along the eastern Pacific coast has changed several times in recent years. Behrens (1991) reported seven nominal species — three yellow species: *Doriopsilla albopunctata* (Cooper, 1863), *Dendrodoris fulva* (MacFarland, 1905), and *Dendrodoris* sp. 1; one red to black species: *Dendrodoris krebsii* (Mörch, 1863); and three grayish pale or white species: *Dendrodoris nigromaculata*, *Dendrodoris* sp. 2, and *Dendrodoris* sp. 3. Later, Valdés and Behrens (1998) added *Doriopsilla spaldingi* Valdés and Behrens, 1998, to this fauna. One additional eastern Pacific dendrodoridid species, *Doriopsilla janaina* Marcus and Marcus, 1967, is found to the south within the Panamic Province (Marcus and Marcus 1967). Gosliner, Schaefer, and Millen (1999) described *Dendrodoris* sp. 1 as a new species, *Doriopsilla gemela* Gosliner et al., 1999, and at the same time regarded *D. fulva* as a junior synonym of *D. albopunctata*. Behrens (2004) noted the name change of *D. krebsii* on the Pacific coast of the Americas to *Dendrodoris fumata* (Rüppell and Leuckart, 1830), after Valdés et al. (1996) reported that the specimens from the Caribbean and Eastern Pacific were distinct. *Dendrodoris* sp. 3 remains undescribed. The present paper deals with recently collected material of *Dendrodoris* sp. 2.

The first known collection of *Dendrodoris* sp. 2 was made in 1977 in a benthic trawl sample taken by Dr. Rim Fay and Robert Henderson of the then Pacific Biomarine Laboratories, of Venice, California. The collectors noted that it was distinct from all other porostomes on this coast. Periodic trawls in the same area over the next several years failed to produce any additional specimens. This specimen has subsequently been lost. On 12 July 2000, Clinton Bauder photographed the species in about 54 m, in Carmel Bay, California (Rudman 2000; Behrens 2004). Bauder and his team of deepwater technical divers have searched for another specimen ever since with no success. Additionally, there have been several sightings of this species from 45–54 m, respectively in La

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Jolla Canyon, San Diego, California by George Spalding III (Behrens 2004), but specimens were not collected.

The present paper describes this species based on the La Jolla specimen, which has been deposited in the type collections of the Natural History Museum of Los Angeles County.

SPECIES DESCRIPTION

Dendrodoris azineae Behrens and Valdés, sp. nov.

(Figs. 1–3)

White Porostome Behrens, 1980:100–101

Dendrodoris sp. 2 Behrens, 1991:72

Dendrodoris sp. 3 Rudman, 2000:<http://www.seaslugforum.net/dendsp3.htm>

Dendrodoris sp. 2 Behrens, 2004:43

TYPE MATERIAL. — Holotype: LACM 3035, La Jolla Canyon, San Diego County, California, March 14, 2004, 54 m depth, one specimen 35 mm preserved length, collected by George Spalding III. The specimen is dissected.

EXTERNAL MORPHOLOGY. — Living animals reach up to 75 mm in length. The general color of the living animals varies from opaque white to a creamy-tan (Fig. 1). The margin of the notum is slightly ruffled and is edged with a white band. The clavus of the rhinophore is deep purple, below which the shaft has dense patches of the same purple on the posterior side. This gill is also purple.

The body is oval (Fig. 1), high, lacking spicules. The dorsum is smooth, with no tubercles. The posterior end of foot is translucent white. The rhinophores are perfoliate with 17 lamellae. The gill is composed of six bipinnate leaves which are somewhat separated from one another. The anus is central between the branchial leaves.

Ventrally there are no oral tentacles. The mouth is reduced to a pore.

INTERNAL ANATOMY. — The digestive system has an oval buccal bulb (Figs. 2A–B), with two strong retractor muscles attached. From the posterior end of the buccal bulb emerge the pharynx and a narrow duct that splits into two and connects to the ptyaline glands. The paired ptyaline glands are large and situated ventral to the anterior portion of the digestive system. The pharynx is long and connects directly to the esophagus through a narrow duct. The esophagus is also long and has two esophageal glands situated next to the connection of the pharynx. The esophagus widens progressively towards the posterior end and becomes wide and muscular proximally. The intestine is long and straight and bears a small, oval pyloric gland near its proximal end. The hermaphroditic gland is separated from the digestive gland.

The heart is large and connects to the blood gland through a conspicuous aorta. The blood

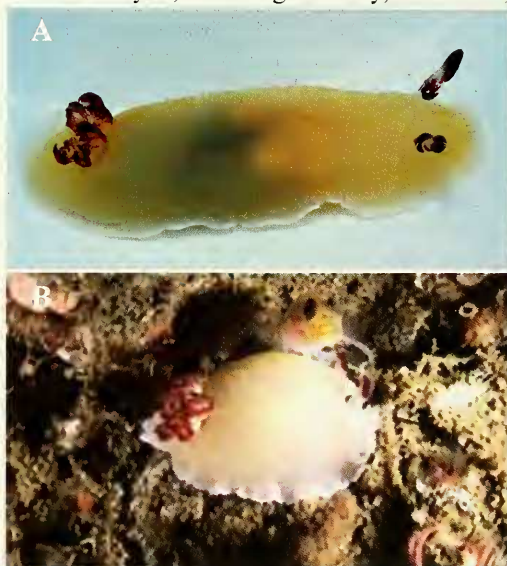


FIGURE 1. Living animals of *Dendrodoris azineae* sp. nov. (A) Holotype from La Jolla Canyon, California, 54 m depth (LACM 3035), photograph by Eric Hanauer. (B) Specimen from Carmel Bay, California, 54 m depth, 30 mm long, not collected, photograph by Clinton Bauder.

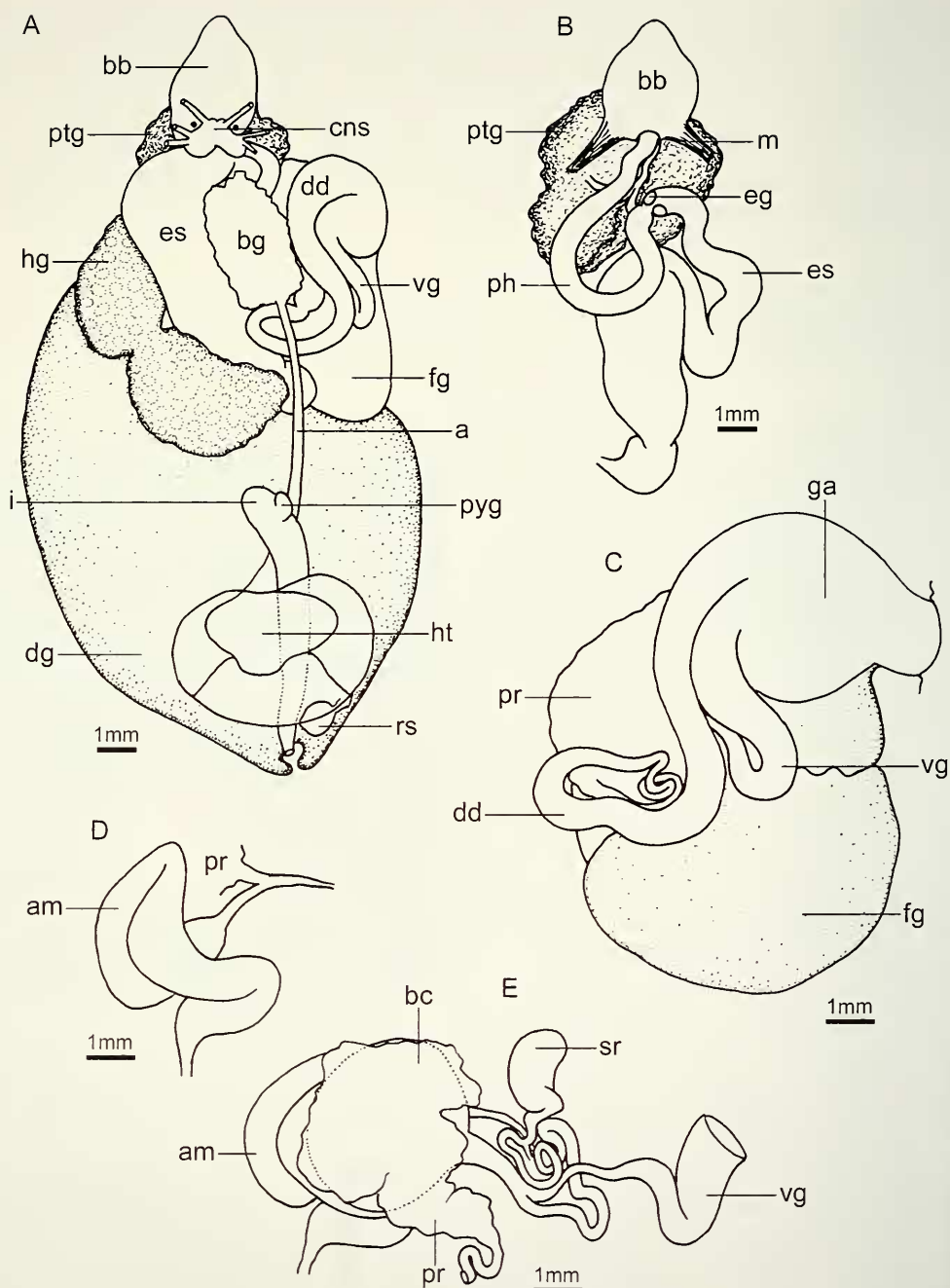


FIGURE 2. Anatomy of *Dendrodoris azineae* sp. nov. (LACM 3035). A. Dorsal view of anatomy. B. Anterior portion of the digestive system. C. General view of the reproductive system. D. Dissected view of ampulla and prostate. E. Dissected reproductive organs. Abbreviations: a = aorta, am = ampulla, bb = buccal bulb, bc = bursa compulatrix, bg = blood gland, cns = central nervous system, dg = digestive gland, dd = deferent duct, eg = esophageal gland, es = esophagus, fg = female gland, ga = genital atrium, hg = hermaphrodite gland, ht = heart, i = intestine, m = retractor muscle, ph = pharynx, pr = prostate, ptg = ptyaline gland, pyg = pyloric gland, rs = renal sac, sr = seminal receptacle, vg = vagina.

gland is situated posterior to the central nervous system and covers portions of the reproductive system. There is an oval renal sac situated on the right hand side of the heart and connected to the pericardium.

The reproductive system is triauleic (Figs. 2C–E). The ampulla is long and convoluted, and branches into a short oviduct and the prostate. The oviduct enters the female gland in the center of the mass. The prostate is flattened and short, covering most of the bursa copulatrix. The prostate connects with a narrow duct that expands into the long, wide and muscular deferent duct. The vaginal duct is very long and wide. Both the vaginal duct and the deferent duct open into a large, muscular genital atrium. The proximal end of the vaginal duct joins the rounded bursa copulatrix. From the bursa copulatrix leads another duct that branches into a short uterine duct and the pyriform seminal receptacle. The penis is very long and smooth, covered with several rows of penial hooks (Figs. 3A–B). The distal spines seem to include some longer, blunt spines.

ETYMOLOGY. — The name *azineae* was chosen at the request of George Spalding III of Solana Beach, California who collected the holotype. It is meant to honor his daughter Azine, who gives him the inspiration to continue his deep dives in search of new marine species in the La Jolla submarine canyon.

DISTRIBUTION. — Thus far the species is known from La Jolla Submarine Canyon (present study), Sycamore Banks, offshore of Malibu, California (Behrens 1980, 1991) and Carmel Bay, California (photographs by Clinton Bauder).

NATURAL HISTORY. — Little is known about the natural history of this species. It has not been observed with any sponge species. All specimens have been observed on sand or rock substrates. In his usual manner, Mr. Spalding recorded the water temperature at the time of collection of the holotype as 10.6°C, at the collection depth of 60 m. We have no information on the species' egg mass.

DISCUSSION

This species is placed in the genus *Dendrodoris* Ehrenberg, 1831, because of the presence of the following combination of characters: dorsum lacking a network of spicules, anus located centrally between the branchial leaves, digestive system with two ptyaline glands, radula and jaws absent, and esophagus with a pair of esophageal glands. Valdés and Gosliner (1999) found these characters to be diagnostic for *Dendrodoris*, which is a monophyletic group.

A review of the literature shows that there are no other species with a similar external coloration to *Dendrodoris azineae*. The Atlantic species of the genus were reviewed by Valdés et al. (1996), who found considerable external variability within the nine taxa examined. However, none of the Atlantic species have a uniform white background color with purple rhinophores and branchial leaves. Brodie et al. (1997) examined the systematics of the tropical Indo-Pacific species *Dendrodoris nigra* (Stimpson, 1855) and *Dendrodoris fumata* (Rüppell and Leuckart, 1830). These authors also found great external variability in these two species, but none of the color forms are similar to *D. azineae*.

There are no other described species of the genus *Dendrodoris* along the coast of California. *Dendrodoris fumata* is the only other species of *Dendrodoris* described from the eastern Pacific. This tropical species is found within the Panamic Province, from México to the Galápagos Archipelago (Behrens 2004). Valdés et al. (1996) described the external morphology of eastern Pacific specimens of this species under the name *Dendrodoris nigra* (Stimpson, 1855). It differs from *Dendrodoris azineae* in several regards, including the presence of a uniformly colored (yellow, pink, gray, orange, red, or black) background (Brodie et al. 1997) and wider mantle margin with conspicuous striations. Brodie et al. (1997) described the anatomy of *D. fumata*, which has a

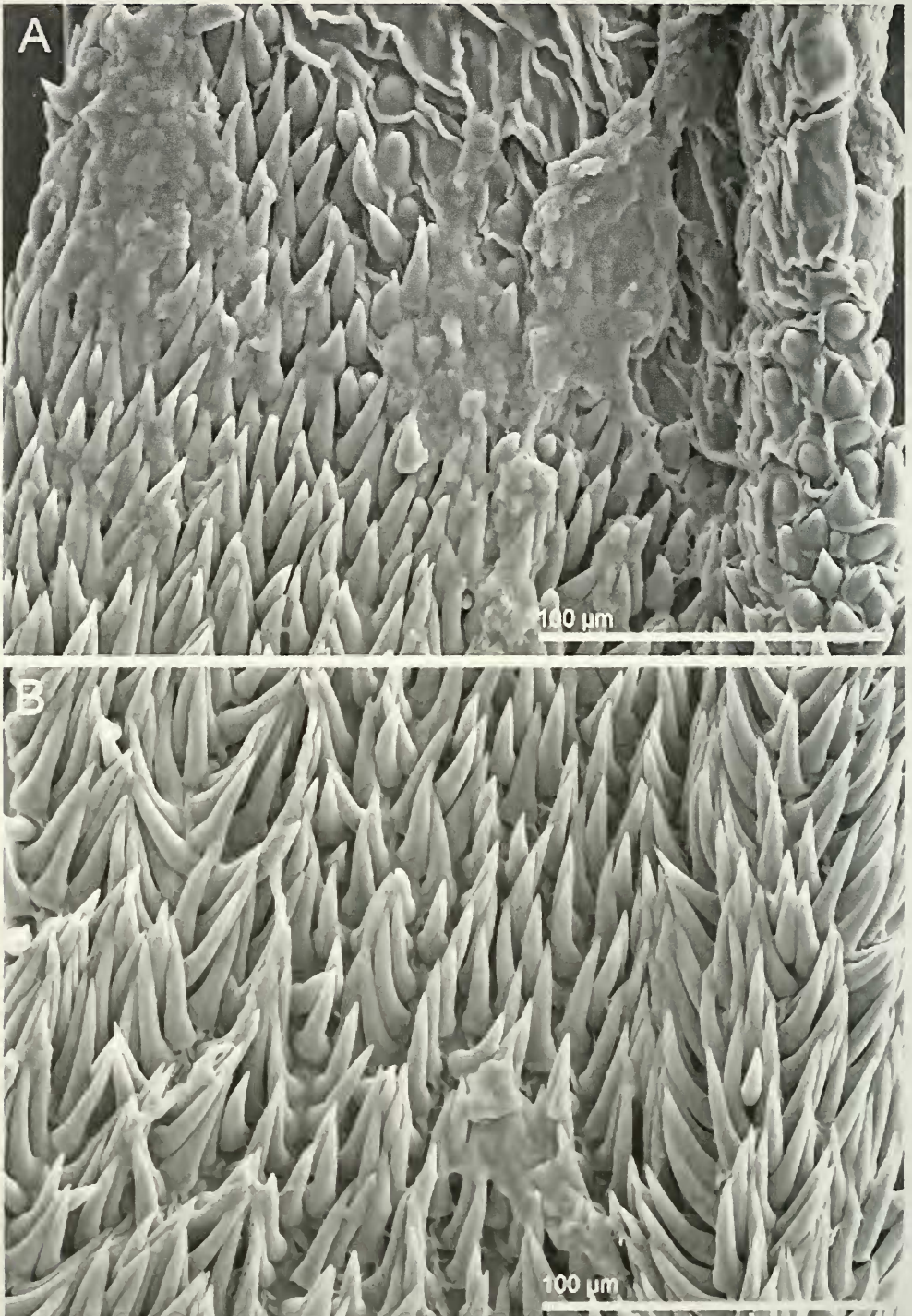


FIGURE 3. Scanning electron micrographs of the penial spines of the holotype of *Dendrodoris azineae* sp. nov. (LACM 3035). A. Distal portion of the penis, B Proximal portion of the penis.

prostate much smaller than that of *D. azineae* and the bursa copulatrix and seminal receptacle are about the same size, whereas in *D. azineae* the bursa copulatrix is much larger. Other differences include the shape and size of the ampulla, which is shorter and wider in *D. fumata*, and the genital atrium, which is much larger in *D. azineae*.

Dendrodoris sp. 3, *sensu* Behrens (1991), is also a white species, but it differs from *Dendrodoris azineae* by having large brown spots on the dorsum and white rhinophores and branchial leaves. This species remains undescribed.

ACKNOWLEDGMENTS

The authors would like to recognize the generous efforts of all of those who have spent many hours searching over the past 20-plus years for specimens of this new species: Clinton Bauder and his fellow members of the Bay Area Underwater Explorers, George Spalding III, Peter Brueggeman, Jim Lance, Rim Fay and Bob Henderson. Thanks also to Eric Hanauer and Clinton Bauder for permitting us to use their photographs for preparation of the color images.

This paper was supported by the National Science Foundation through the PEET grant DEB-9978155 *Phylogenetic systematics of dorid nudibranchs* to Terrence M. Gosliner and the junior author.

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